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Chemical and Physical Properties of *Boswellia Frereana* Tree Resin Oil from Northern Somalia

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DEDICATION

To my beloved Parents, Mohamed Ali and Sofia Warsame

To my lovely Wife and kids. To my brothers and sisters. To all my great family. To all those who light a candle in my way to learn

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ABSTRACT

Boswellia frereana resin one of the most important product was collected from a tree endemic to North Somalia, within subcoastal zone from near sea-level up to 750 (-1000).

The aim of this study is to investigate oil content, oil physical and chemical properties and oil constituents.

Oil content of *B.frereana* determined by British pharmacopeia, physicochemical properties determined by British standard and Oil constituents by GC/MS chromatography.

The results showed that oil content of *B. frereana* was 7.22, Physical properties of *B. frereana;* oil colour was yellow, volatilization (volatile at normal temperature), density (0.87g/cm3), refractive index nDt (1.47) and viscosity (96.4), while chemical constituents; acid value (1.97) and ester value 76.6). GC/MS showed 79 compounds; 58 of which are mono terpense (72.5%), 12 sesquiterpenes (15%) and the rest are not identified; The major components were alpha - thujene (18.62), O-cymene (10.55) and alpha - pinene (10.06); the minor components are 13 namely; sabinen (6.99), tetracyclo [10.4.0.0 (2,11). (3,8)] hexadeca - 3 (8), 4, 6, 9 - tetraene - 2 – carbonitrile (6.91), D-limonene (5.55), 1, 3 - dimethyl cyclohexene (5.09), alpha - phellendrene (4.91), eucalyptol (3.52), P - cymen – 8 - ol (1.76), cyclofenchene (1.67), pinocarvone (1.52), D - alpha - pinene (1.33), linalool (1.16), alpha - terpinol (1.12) and trans - pinocarveole (1.02). And the other were traces elements.

we can conclude that oil content and physicochemical and oils constituents were comparatively as the same as the international standards.

Further investigations in bioactivity of *B. frereana* oil, evaluation phytochemical studies of *B. frereana* to identify flavonoids, phenolic acids, alkaloids, and ester glycosides Extraction and isolation of bioactive compounds from *B. frereana* whole extracts are needed; beside formulation of isolated active compounds drugs are also recommended.

مستخلص البحث

صمغ اللبان (*Boswellia frereana*) واحد من المنتجات الاكثر اهمية، وهذه العينات تم جمعها من أشجار مستوطنة في شمال الصومال، في المنطقة المحاذية للساحل قرب البحر في ارتفاع يتراوح بين 750 - 1000 متر فوق البحر.

الهدف من هذا البحث هو تحديد كمية الزيت وخواصه الكيميائية والفيزيائية ومكونات الزيت المستخرج من صمغ اللبان.

تم تحديد نسبة الزيت بالفارماكوبيا البريطانية، والخواص الفيزيائية بالمواصفات البريطانية و مكونات الزيت العطري بكروماتوغرافيا الغاز السائل المزود بالكتلة الطيفية.

أظهرت النتائج أن نسبة الزيت (حجم/وزن) (7.22)، والخواص الفيزيائية من لون (أصفر)، كثافة (جم/ سم ^{3}) (0.87)، معامل انكسار (1.47) ولزوجة. بينما الخواص الكيميائية فكانت: رقم الحمض (1.97) ورقم الاستر (76.6). وكروماتوغرافيا الغاز بالكتلة الطيفية أظهر 79 مركب منها 58 تربينات أحادية (72.5%)، و 12 سيسكويترتربينات (15%) والبقية غير معرفة . أهم المركبات الرئيسية (alpha - thujene) (18.62)، (O-cymene)، (10.55) و (alpha - pinene) (10.06). المركبات الثانوية كانت 13 مركبا وهي، (sabinen) (6.99)،(tetracyclo [10.4.0.0 D-)،(6.91) ((2,11). (3,8)] hexadeca - 3 (8), 4, 6, 9 - tetraene - 2 – carbonitrile (1, 3 - dimethyl cyclohexene (5.09), alpha - phellendrene)،(5.55) (limonene)،(1.67) (cyclofenchene)،(1.76) (eucalyptol (3.52), P - cymen – 8 - ol)،(4.91)(alpha -)،(1.16) (linalool)،(1.33) (pinocarvone (1.52), D - alpha - pinene (terpinol) (1.12)،(trans - pinocarveole) (1.02). والبقية مركبات آثار.

الزيت العطري لصمغ اللبان هذا من حيث كمية الزيت والواص فات الكيميائية والفيزيائية مقارنة بالزيوت العطرية العالمية مناسب وينافسها.

نوصي بإجراء المزيد من الأبحاث في النشاطات الحيوية لزيت صمغ اللبان لتحديد مكوناته الأ خرى من جليكوسيدات وقلويدات و فلافينات و فينولات وغيرها.

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List of abbreviations

WHO = World Health Organization

GC/MS = Gaz chromatography attaché with mass spectrophotometer.

OTC = Over-the-counter

Fig. = Figure.

HPLC = high-performance liquid chromatography

CCC = Counter-current chromatography

SFC = Supercritical fluid chromatography

ISO = International Standard Organization on Essential Oils

HD = Hydrodistillation

SD = Steam distillation

HD = Hydrodistillation

MAHD = Microwave-assisted hydrodistillation

UAE = Ultrasound-assisted extraction

B. = *Boswellia*

AOAC = American Official Analytical Chemist

GMC = British Pharmacopoeia

BSI = British Standrd Institution